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Economic Conditions
Governmental Finance
United States Securities

NEW YORK, SEPTEMBER, 1917.

General Business Conditions.

THE most important feature of the business situation is the gratifying progress made by the crops during the last month. The small grain is now harvested. Wheat is threshing out better than expected, oats are a tremendous crop, big in yield and fine in quality, and barley and rye are good. Corn only wants to be let alone by the frost to make a crop larger than the record by 300,000,000 bushels, and larger than last year's by 800,000,000 bushels. Potatoes, beans, garden products and fruits will be in abundant supply. The pack of all kinds of canned and dried goods will be much larger than usual, but is being put up on a higher basis of costs than usual.

The price of old corn in Chicago is down about 50 cents per bushel from the top, to about $1.80 per bushel, and the new crop for December delivery is down to about $1.08 per bushel. Meats, however, will be higher for some time, as many cattle and hogs have been sacrificed in an unfinished condition, on account of the high price of all kinds of feed. Hogs have sold up to $20 per hundred weight at Chicago during recent weeks upon small receipts, but from this there has been a reaction to about $18.00. Well posted persons say that there are fewer corn-fed cattle in feeders' hands than at any previous time since the beef-making industry was well established.

The cotton crop promises very well east of the Mississippi River, but has suffered from drought in Texas. It is now thought probable that the yield will be above either that of last year or the previous year, and as the South has undoubtedly raised more of the food crops than heretofore the outlook for that section is very good. A crop of 14,000,000 bales is possible, which will about meet consumptive requirements and promises very remunerative returns to the producers. The market is down several cents from the top, closing the month at about 22 cents per pound.

To sum up, the yield of agricultural products now promises to be large, and with prevailing prices the purchasing power of the agricultural districts in the coming year will be beyond all past experience.

This situation is very reassuring because it puts a solid basis under business for the coming year. It means that a great reserve of purchasing power exists in the country, more in fact than can be exercised with the present war requirements. It should put the farming industry permanently on a better basis financially. Moreover, although agricultural products will bring prices which, taken together with the large yield, will be very remunerative to the growers, the supply is sufficient to meet the needs of the population, and to give assurance that the necessaries as a rule will not average higher than during the last year, and in most cases should be lower.

The best criterion as to general trade is to be found in railway traffic, which is constantly up to the capacity of the roads, and for June was 26 per cent. above the tonnage of the same month last year. There would be more if they could handle it. The companies are straining every resource, and the public is cooperating by loading cars more heavily, but in many instances production is still held in check by the inability of the roads to move materials.

Labor troubles continue to give embarrassment, particularly in the copper mining and lumber districts of the West. Lumber production has been seriously hampered in the Pacific northwest. It is to be hoped that with prices for the common articles of food upon a more normal basis the industrial situation will be less strained.

Government Finance.

The Secretary of the Treasury in July submitted to Congress a detailed estimate of the expenditures of the government to June 30, 1918, for war and civil purposes, but not including loans to allies, which aggregated $10,735,807,000, and estimated the revenues under existing laws at $1,300,000,000. Apparently these estimates have been very considerably increased.

The following table shows the plans submitted for raising in all nearly $22,000,000,000:

	Authorized	*Proposed*	*Total* To June 30, 1918
Bonds for loans to Allies	$3,000,000,000	$4,000,000,000	$7,000,000,000
Certificates of indebtedness	2,000,000,000	2,000,000,000	4,000,000,000
Bonds for general purposes	2,000,000,000	2,000,000,000	4,000,000,000
War Savings Certificates	.....	2,000,000,000	2,000,000,000
Current expenses, exclusive of war	1,300,000,000	.....	1,300,000,000
Pending revenue bill	.....	3,000,000,000	3,000,000,000
Bonds for conversion (*)	.....	538,945,460	538,945,460
	$8,300,000,000	$13,538,945,460	$21,838,945,460

(*) Panama Canal	$225,000,000
Naval construction	150,000,000
Mexican Border, D. W. Indies and Alaskan Ry.	100,000,000
Panama Canal 3s—Issued 1916	63,945,460
	$538,945,460

In the war expenditures are included $176,000,000 for the new insurance bill and $1,000,000,000 for the Shipping Board. The plan for the war savings certificates is that they be placed on sale at all post offices and be issued in denominations as low as $5 or even $1; that sales to one person be limited, probably, to one thousand dollars.

It is likely that the actual disbursement of these sums will extend beyond the present fiscal year, but the appropriations must be made in order that contracts may be authorized. The recent additions are largely for merchant shipping, which will be of permanent capital value.

The sums required are enormous but in measuring the ability of the country to raise them it is to be considered that the real problem is that of supplying at present prices the amount of equipment, materials and services which these estimates contemplate. Prices for everything are high, and the production of the country in all lines is greater than ever before. It must be sustained and increased, and our consumption for non-essential purposes must be reduced, in order that the war demands may be met.

While in the last analysis the task is that of producing war supplies for our own armies and those of our allies to the amount named, the effort is complicated by the fact that the money for making the payments must be raised in large part by voluntary subscriptions to the government's loans. The fact that the money will be paid out to our own industries simplifies the task, and beyond question makes it possible, but since the benefits of these expenditures will flow to every class and locality, it follows that every class and locality must cooperate fully in returning the funds to the Treasury.

The next loan is expected to be for $3,000,000,000 and to come on in the latter part of October.

Price-Fixing and Taxation.

Price-fixing at the hands of the government authorities and the new measures for taxation are still factors of uncertainty in business calculations. The authorities will closely supervise the movement of the wheat crop out of first hands, through the process of manufacture into flour, and through distribution to consumption, determining the profit of every handler. An elaborate organization has been formed for this purpose, mainly composed of business men who give their services without compensation, and the grain and flour dealers have accepted the plan cheerfully, agreeing to cooperate. The scheme is an emergency one, impracticable as a permanent policy, but it will have the gratuitous aid of the most expert business talent in the country, and it will give assurance to the public that there will be no speculative profits in handling wheat or flour. In the present state of public temper this assurance is worth much, even though it does not follow that the handling will be done with any actual saving to the public over the cost by the ordinary methods. The price of grain fluctuates naturally throughout the year, with prospects for crops in all producing countries, and the carrying of grain for future consumption is necessarily a speculation. When crops are good, prices decline and loss ensues to those who have stocks; when crops are poor, prices advance and gains are realized. The fluctuations are downward as often as they are upward.

The price of wheat to July 1, 1918, has been fixed at $2.20 per bushel at Chicago for No. 1 Northern Spring, or its equivalent.

The British government was able to sell wheat for a time last spring lower than it was selling in the United States because it had a stock on hand purchased months before at lower prices. But if it did not take a profit on a rising market, it would have no reserve to save itself from loss on a falling market, and in presenting its plan of operations to Parliament the government frankly admitted that it proposed to stabilize the price of bread, meeting any deficit that might arise in its operations from Treasury funds.

The price of coal has now been fixed by an order of the President, varying with different fields. The price of steel is under inquiry and may be authoritatively fixed for government use. There is every reason to believe that the authori-

ties will be guided in this policy by what they conceive to be the best interests of the public, and that they will seek to make prices that are fair to producers, but the whole policy is an experiment, and unless it is carried to extremes and the results are very pronounced it will never be known whether the experiment is successful or not. That is to say, it will never be known whether the net final results are more advantageous than the results that would have followed upon natural prices. It is not by any means certain that prices made artificially low are the most desirable. Prices have an important function in bringing supply and demand into equilibrium, adjusting them to each other.

The Senate still has the revenue bill under consideration, debating proposals to increase the levies upon incomes and profits. In the nature of this problem it is very difficult to have these proposals judged upon their merits. The advocates of extreme levies upon profits insist upon viewing book profits as on hand in cash, about to be withdrawn and devoted to the personal benefit of the shareholders, but the fact is that in the present condition of industry they are in actual use, and necessary in most cases to the effectual conduct of the industries. For the second time since the war began the Bethlehem Steel Company is now going to the public market with its securities, to raise money to carry on and enlarge its business. The enlargement of industrial capacity at this time is not something that concerns only the proprietors; these industries in peculiar degree are public industries in the sense that they are producing supplies to carry on the war. The enlargements are made upon a level of costs probably 50 per cent. above normal, and nobody knows what these investments will be worth after the war. If an industry like Bethlehem Steel puts all of its current profits into enlargements, and borrows money to pay taxes equal to 50 per cent., or more, of those profits, and after the war finds that the value of the new investment has depreciated 50 per cent., or more, or is actually unproductive, what will its position be? The profits which Senators are naming are in many instances paper profits, which stockholders have not seen and never will see, because the shrinkage in the value of inventories and plant investments will cause them to disappear.

The British Tax.

A favorite argument for high taxes has been that the British government has exacted 80 per cent. of the profits in excess of the pre-war level, "without unfavorable effects." This 80 per cent. rate was contained in the Budget submitted to Parliament last April, but it was not adopted until August and has been in effect less than a month. Evidently it is too early to report on the effects. Moreover, the British government has been at war three years, and has carried the expansion of its industries a long way, and finally, to make the situation comparable it would be necessary to know the full terms of the treatment accorded companies handling war business, and particularly in regard to profits reinvested for the enlargement of output.

The Money Market.

The money market has become firmer in the last month, reflecting the heavy fall demands which are foreseen. Five per cent. is the minimum rate for time money, while the call rate has been fluctuating around three per cent., but closed the month at 4½% to 6%.

Reports from throughout the country indicate that banks are in comfortable position, although well loaned up at the centers. Country banks are easier and expecting a great increase of deposits when the crops are moved.

The abstract of the condition of banks in the Federal reserve system on June 20th, issued by the Comptroller, shows that on that date all members held $859,421,000 in excess of the required reserves, as compared with $987,763,000 on May 1st. Country banks held an average reserve of 24.05 per cent., of which 6.56 per cent. was in vault, 8.14 per cent. was in Federal reserve banks and 8.21 per cent. was with approved reserve agents. Reserve city banks held 21.68 per cent., of which 6.31 per cent. was in banks, 8.03 was in Federal reserve banks, and 8.11 was with approved reserve agents. Central reserve city banks held 20.47 per cent.

The report of the Federal reserve banks for August 24th showed bills discounted for members down to $128,407,000, and bills bought in the open market at $159,557,000, the lowest point reached since the Liberty Loan was closed. These banks are in strong position to go into the fall season, and there should be no hesitation on the part of member banks to use their facilities to handle the legitimate fall business. It is evident that the demands upon the banking facilities of the country will be very great in the months intervening between now and the new year. A great crop has been produced, and owing to the high prices at which it will be moved approximately twice as much money and credit will be required to handle a given quantity as in ordinary years. The industries, for the same reasons, will require more working capital than ever, and as trade will be active merchants' stocks will have to be large, and will run into unusual values. Finally, there will be the new government loan, calling for an unprecedented sum. These demands altogether look formidable, and unquestionably they mean that the bankers must be alive to the task which devolves upon them, and make intelligent use of the facilities of the reserve system. All of these requirements can be met by the shifting of credit within the country, and if good sense prevails that credit will be self-liquidating.

The Bank of Charleston, South Carolina, has issued a statement recently which illustrates the situation. It says, in part:

"The average value of our cotton crop, lint and seed is $90,000,000, and the average debt against the crop before it is gathered is $75,000,000, leaving an average surplus of $15,000,000. This year the crop is in a fair condition; prices are so much higher than usual for both cotton and seed that unless some disaster occurs we may expect from our cotton crop $165,000,000; and from what I can learn the debt this year is no larger than the average, $75,000,000, which will leave a surplus of $90,000,000. This will give all of our people more money at one time than we have ever seen before, and we ought to be thinking and making plans as to what we are going to do. I earnestly recommend that for our customers the best investment they can make is to purchase their own obligations—that is, pay their debts. If this comes to pass, all of the banks in our State will have more money than they can profitably use at home, and it will be necessary to find outlets for it."

What is true of South Carolina is doubtless true of the agricultural sections generally. If the crop moves rapidly an unusual amount of bank credit will be required for a time, but the crop will liquidate it and give a surplus for the liquidation of older indebtedness.

There need be no anxiety about the expansion of credit to handle the crops or the strictly necessary exchanges of the country, provided that everywhere the advice given in the above extract is acted upon, and the people take advantage of these high prices to pay their debts. The danger in all such periods is that people may use their new resources to assist them in going further into debt. If debt-paying is the rule, the final result of the big crop and high prices will be the release of a large amount of credit which will be available for the government loans.

The Supply of Currency.

In so far as an increased amount of currency is wanted, it should be supplied in Federal reserve notes. This is a matter in which every bank in the country should lend its cooperation. These notes are just as good in circulation as reserve money, and the latter should be withdrawn from circulation at every opportunity and forwarded to the Federal reserve banks, thus broadening the base under the credit structure.

Now that state banks and trust companies are permitted to join the Federal reserve system without surrendering any of the privileges they now enjoy, and even have the privilege of withdrawing from the system later if they choose to do so, there seems to be no good reason why a general consolidation of the banking reserves of the country should not be effected. It would not only increase the common sense of security throughout the country, which is of importance to all bankers, but it would add greatly to the financial prestige of the country in its international position. This is no time to hold back from any step which will strengthen the financial organization of the country. Each banker should do that which he knows it is in the public interest for all bankers to do.

All of the reserve banks are earning more than six per cent. on their capital now, and will soon be accumulating surplus funds which will serve to stabilize their dividends in the future.

The International Exchanges.

The foreign exchanges have been of late the occasion of no little perplexity. Exchange on the United States is now at a discount generally, in neutral countries, notwithstanding the fact that the balance of trade between this country and the rest of the world for the fiscal year ended June 30th last reached the enormous total of $3,634,828,870. The explanation is to be found in the relations between the dollar and the pound sterling. Extraordinary efforts have been put forth to sustain the pound sterling in this market. The British government has bought or borrowed American securities from its citizens on a great scale, which have been sold or pledged in this country, borrowed heavily, and shipped enormous amounts of gold to New York for this purpose, and the exchange rate has been stabilized within about two per cent. of the parity. For various reasons it has not been so well sustained in other markets, with the result that exchange dealers in Madrid, Yokahama, and other financial centers have sold sterling exchange in New York not only to settle any indebtedness those markets might have to this country on direct trade, but in large additional amounts. In short, this being the best place to realize on sterling exchange it comes here from all quarters. Any restrictions which London may place upon gold exports to other countries are evaded by selling sterling in New York and taking gold from here.

This proceeding has not been pleasing either to London or New York. The former is anxious not only to sustain the rate of exchange with New York, on account of its great purchases here, but to keep this money market easy to facilitate its borrowing. The leakage of gold from here counteracts its efforts. On the other hand, neither the Treasury authorities nor bankers of this country relish having this country's gold stock drawn on to settle the trade balance of Great Britain.

Shipping conditions in themselves, with high insurance rates, have tended to hold the export movement in check, and to raise exchange rates, and in some instances even the country to which gold was shipped has discouraged the movement, on the ground that its gold stocks were already ample and that more would aggravate the state of inflation already existing. The Scandinavian countries were the first to adopt this policy, nearly two years ago, and the Bank of Spain is now discounting

American gold coin about six per cent. Furthermore, the leading banking institutions of this country, for public reasons have declined to participate in gold shipments from this country. Although there was a handsome profit in such transactions, they have held that it was in the public interest at this time to discourage gold exports and compel the settlement of international transactions by other means.

Parties who have not understood the situation have complained of this attitude on the part of the banks, and have conducted an agitation in favor of having the Reserve banks take over the foreign exchange business, to facilitate the operations of merchandise importers, but the reason for the attitude of the bankers has been well known to the reserve banks and the government authorities.

The Treasury and the Reserve banks have no option, however, under the law, but to pay gold upon the presentation of paper money redeemable in gold, and under this condition, and with the opportunity open for profit, it was inevitable that gold would go out, and it has been moving in increasing volume, the exports for May and June being $57,697,419 and $67,164,268, respectively, the most noteworthy movements being to Spain and Japan. There has been a direct balance on trade account from the United States to Japan, but hardly large enough to care for all the gold that has been taken. The movement to Spain has been in the face of a trade balance in our favor.

London financial journals have been prodding the British government to take up the subject with the United States government, and conferences upon the subject have been had. The way has been cleared for government regulation by including coin and bullion among the commodities named in the President's proclamation of embargo, and henceforth exports can only be made as permitted by the government. It remains to be seen to what extent exports will be restricted. Evidently the problem is a very difficult one and the ultimate remedy is probably in the regulation of the trade which creates the balances, but this is a very delicate task in the present state of international relations.

No country likes to put restrictions upon the free movement of gold in the exchanges, but in time of war it is entirely proper to refuse to allow it to be taken out of the country except for payments which have official approval as in the national interest. There are transactions, legitimate in themselves, but not important enough to justify the loss of gold, which might be allowed provided settlement could be effected by the direct exchange of commodities or securities. This would be a return to something like the operations of barter, when ships were owned by merchants, and a vessel put out with a cargo and traded its way around the world, bringing back a cargo of goods saleable at a profit in the home country.

Again, all trade between countries might be settled through the governments, each government settling with its own people by means of domestic credits and the balances between the governments being settled by giving them obligations. Such an arrangement, however, would involve, almost inevitably, restrictions upon trade, confining it to transactions having governmental approval.

The British Government has approved of gold exportations direct from this country to India in settlement of our trade with that country, which suggests that this would be a good time for the United States Government to relieve itself of the great store of silver dollars, over $400,000,000 of which lie in its vaults as a quite superfluous reserve against paper currency. Those silver dollars could be more readily spared than gold, and if India is not paid in silver she will have gold.

Bond Market.

The usual midsummer dullness has been emphasized by general market conditions. Dealers report a small counter business but investors and bankers in general have been awaiting definite announcement regarding the next Liberty Loan.

According to the *Wall Street Journal* compilation the combined average of forty high grade issues is 89.19 for August 28, 1917, compared with 90.19 July 28, 1917, and 93.88 August 28, 1916.

Very little new financing has been announced and the few issues offered to the public have been in the form of short term notes. At the present time there seems to be a stronger demand for one year notes as the major portion of the financing has been confined to two year maturities.

The municipal market was quite active with a good demand from private investors, estates and institutions. This demand was occasioned in part by the talk of a taxable government loan and the fact that municipals have reached the level of prices ruling at the outbreak of the war.

The following municipal sales occurred during the month, which are of interest:

$ 3,000,000	State of California Serial 4½s.
1,000,000	State of Tennessee 1 year 5s.
1,250,000	City of Waterbury, Conn., Serial 4½s.
950,000	Westchester County, New York, Serial 4½s.
210,000	Cincinnati, Ohio, School District 20-40 optional 4¼s.
850,000	Syracuse, New York, Serial 4½s.
573,000	Nassau County, New York, Serial 4½s.
1,235,000	Cleveland School District, Serial 5% Bonds.
927,000	Des Moines, Iowa, Serial 5% Bonds.
25,000,000	New York City 3½-6 Months' Revenue Notes.
500,000	State of Oregon Serial 4s.

Industrial Service Department National City Bank.

The management of this Bank has been for some time impressed that in order to render the greatest possible service to its patrons among the manufacturing industries there should be a department of the Bank organized especially to deal with them, and equipped with a staff thoroughly qualified to understand the all-around problems which beset the American manufacturer in his business.

There are many signs indicating that production in all the industries is going to be more scientifically conducted in the future than it has been in the past. Industries are not going to grow up quite so much at random or be managed quite so much by rule-of-thumb as heretofore. They will be more carefully located, methods will be more generally standardized, relations with employes will receive greater consideration, and from the beginning of the process to the end every detail will be studied to obtain greater efficiency. Many of our manufacturers have been making good progress along these lines, but the investigations of the Federal Trade Commission show that, taking the whole body, there is vast room for improvement, even in the matter of calculating costs. A majority of them, according to the Commission, lack an adequate system of cost-keeping.

The war has had a great influence upon the industries of Great Britain and the other countries of Europe. They have been forced to make the best possible use of their man-power, and patriotism has prompted both employers and employes to be more conciliatory toward each other and more receptive toward the introduction of new machinery and new methods. The increase in production which has resulted has been a revelation and will have lasting results upon industry. The larger output per man reduces the cost of the product, and makes it possible either to lower the price of the product to the consumer, or pay higher wages, or to divide the savings between the public, the employers and the employes. The United States must not be behind other countries in these economies. The war is causing an increase in our industrial capacity, and it will be a problem to keep this capacity employed when the war demands fall off and the first urgent peace demands are satisfied. We must be able to hold our own in competition with other countries, and, furthermore, we must understand that the home demand for everything can be increased by reducing the cost. If everything we consume were halved in price we could buy twice as much, provided the reduction was accomplished by a corresponding reduction in production costs.

Of course, the matter of bank credit is important to a manufacturer. It is one of the factors which must be available to enable him to handle his business in the most economical manner, and it is evident that as a condition to granting credit freely a bank should be well informed upon manufacturing conditions. A great many banks have lost money by lending to concerns which upon a superficial showing appeared to be prosperous, and in many such instances the proprietors thought they were prosperous. On the other hand, many industries have been unable to get the amount of credit they could advantageously use because the conditions were not fully understood by the banker. Industries which were fundamentally sound have failed for want of credit at a critical time because bankers did not feel themselves sufficiently informed upon all conditions to justify them in continued support.

In order to be well informed about a manufacturing business, there is much that a banker ought to know beyond the amount invested in it, or even the "quick" assets shown by the inventory, and past profits shown by earning statements, and this other knowledge cannot be obtained by a busy bank official at his desk or even by a casual call upon the customer. The result is that there is often a lack of contact and familiarity on the part of the banker with the business which he would be glad to serve.

This is the situation which this Bank is now endeavoring to improve by establishing an "Industrial Service" department. The object in view is much broader than that of obtaining information to assist the officers in granting credit, although if this purpose is accomplished the services of the Bank to this class of patrons should be more satisfactory in the future. The Department is intended to be a reservoir and clearing house of up-to-date and serviceable industrial information. It will strive to gather in and disseminate new ideas about industrial methods and industrial conditions, with a view to keeping American business men well informed upon all developments of interest to them, at home and abroad. It will have in its service experts in industrial methods, including cost-accounting, an industrial engineer of training and experience, and such other assistants as may be found useful to carry out the general purpose. The Department is headed by a Vice-President of the Bank, Mr. F. C. Schwedtman, who has had much experience in industrial management. It is not, of course, the intention of the Bank to compete with the engineering firms who make a specialty of advice upon efficiency management, but rather to stimulate interest in the study of improved methods, give such information and counsel as can be rendered without charge, and qualify itself to render the most effective banking service. Our industrial patrons are cordially invited to make free use of

the Department and co-operate with it to the common end of making American industry lead the world.

Steam Power Development.

We gave last month a quotation from Mr. V. H. Manning, Director of the Bureau of Mines, Department of the Interior, in which he said that 25 per cent. of the coal production of the United States was wasted through inefficient use. His point was that a large proportion of the steam engine and boiler plants of the country is not up-to-date and is consuming coal wastefully as compared with results given by plants of the latest and most approved design.

Since engineering methods are always advancing, it is out of the question that all of the power-plants of the country should be at any one time of the latest design, but Mr. Manning's statement is very suggestive as to the importance to the country of improvements in its power equipment. The annual production of coal in the United States is now about 600,000,000 tons, and 150,000,000 tons of this would be saved if all consuming plants were as good as those of the best type. Perhaps the most impressive idea of this saving can be obtained if the reader will think of the labor involved in mining, handling and transporting 150,000,000 tons of coal, and of shoveling it into the fire-boxes; and of the benefits that might be derived by having that labor distributed in the other industries.

If it is interesting to calculate the savings that may be effected in the future by bringing all equipment up to the standard of what at this date is recognized as the best, it is also interesting to compare not only the best practice but the common practice of to-day with the best practice of a generation ago. Mr. Manning's statement has led us to make an inquiry along this line, and looking backward for a starting point we fixed upon the Centennial Exhibition at Philadelphia, in 1876. Doubtless many of our mature readers will remember viewing, as youths, with awe and wonderment, the great Corliss engine which stood at the center of Machinery Hall, and furnished the driving power for all the exhibits in the building. There were seats for the public about the engines; the motion of the great flywheels created a breeze, and the engine was the admiration not only of the non-technical public but of the members of the engineering profession from all over the world.

With the Corliss engine standing out prominently as a landmark in engine development, we appealed to President Alexander C. Humphreys, of Stevens Institute of Technology, for information as to progress in engine-building since that time. It will add a touch of human interest to the story to state that it then developed that Professor Robert M. Anderson, of the Department of Engineering, Stevens Institute, was in part influenced to his choice of a profession by seeing, as a boy, the big Corliss engine in Machinery Hall. By the courtesy of Stevens Institute we have the interesting sketch which follows.

To summarize in the briefest possible manner the progress which it records, the Corliss engine at the Centennial occupied about 54,000 cubic feet of space and consumed 2.2 pounds of coal to develop one horse-power; while a modern steam turbine of equal capacity will occupy 115 cubic feet of space and consume nine-tenths of a pound of coal to develop a horse-power, giving a saving in coal consumption of 59 per cent. According to Mr. Manning's estimate, that the average engine efficiency at the present time is 25 per cent. below the standard of the best type, the average now is well above the best of 1876; and of course the average efficiency in 1876 was much below the Corliss standard.

Even more notable than the improvement in engine and boiler efficiency is the gain accomplished by the development of power-transmission through the electric current. The transmission of power by electricity was unknown when the Centennial Exhibition was held, but in the year 1915, 51 per cent. of all the power applied to industry in the United States, outside of transportation, was delivered by electric current. And as a result of all this development the total horsepower in use in the United States, to each million inhabitants, was 482,392 in 1915, as compared with 68,182 in 1879, or an increase of more than seven-fold. The facility with which power can be transmitted by electric current does away with the necessity of generating power where it is to be used. It can be generated at the most economical spot, as at the mouth of a coal mine or the site of a water-fall, and the industries which use it may be located in a spot more suitable to them. What Professor Anderson says of all this is exceedingly interesting, and his table showing the efficiency of the different types of engines presents the story of power-development so that it can be seen at a glance.

Notes on the Development of the Use of Steam Since 1876.

By Professor Robert M. Anderson, Department of Engineering Practice, Stevens Institute of Technology.

In the center of the Machinery Hall of the Philadelphia Centennial Exhibit, 1876, was placed the large Corliss engine, driving all of the machinery exhibits.

Of the engine, *Engineering*, London, England, said after describing the exhibit: "The engine, as it stands, undoubtedly forms a grand mechanical monument, and it is most fitting that such a prominent exhibit at Philadelphia should be associated with the name of Mr. George H. Corliss, an engineer whose designs have been so extensively adopted, not only in his own country but also in Europe."

The Centennial Corliss may be taken to represent the highest steam engine development at the commencement of a period including the past forty years. This machine consisted of a pair of vertical beam engines, driving a cut gear wheel 30 feet in diameter. In passing, it may be mentioned that the latter was claimed to be the largest cut gear in existence at that time. The

engines were designed to develop collectively 1400 I. H. P. (indicated horsepower), and to be capable of being overloaded to 2500 I. H. P.

Compare this engine in size with the latest design today in steam turbines developing exactly the same horse power. The Philadelphia Corliss occupied a circular platform of 55 feet diameter, and the tops of the working beams were 40 feet above the floor. The actual floor space occupied by the engine proper was probably 30 feet by 45 feet. The total weight of engine and accessories was 607 tons. The radial flow reaction turbine designed and built by Mr. Birge Ljungström, in 1912, at Stockholm, Sweden, develops 1400 delivered horsepower. This turbine is direct-coupled to two electric generators rotating in reverse directions. The over-all length occupied by the turbine and generators is but 17 feet, 5 inches, the greatest diameter is 4 feet 2.5 inches, and the maximum height to the top of the governor 5 feet 6 inches. The size of the turbine proper —the portion to be compared with the Corliss engine— is but 5 feet 1 inch long, 4 feet 2.5 inches in diameter, and 5 feet 4 inches high; or 115 cubic feet against 54,000 cubic feet for the engine of 1876.

As a matter of interest, the size of the 1400 H. P. Ljungström turbine proper is but 28 inches diameter by 21 inches long, and the running discs carrying the reaction blades weigh but 265 and 303 pounds respectively.

The boiler plant for the Centennial engine consisted of 20 vertical Corliss boilers, rated at 70 H. P. each, while today single settings of 2500 H. P. are not uncommon, and some boiler units are built as large as 4000 H. P.

The 1876 simple condensing Corliss, using steam at 70 lbs. per sq. in. without superheat, and with a condenser vacuum of 26 ins. of mercury, operated on a steam economy of 20 lbs. of steam per hr. per I. H. P. or 2.2 lbs. of coal per hr. per I. H. P. The full load (1405 delivered horse power) steam economy of the 1912 turbine using steam at 162 lbs. per sq. in. gage, with 297° F. superheat, and condensing to 28½ ins. vacuum, was 8 lbs. per hr. per D. H. P. (delivered horsepower), or 0.9 lbs. of coal per hr. per D. H. P.

The increase in steam engine economy is, fundamentally, due to obtaining the highest working range of thermal units in the steam in passing through the engine or turbine or—in other words—to transform the maximum number of thermal units into mechanical work, in expanding from a less to a greater volume with the minimum condensation in the traverse through engine or turbine. The increase in boiler economy is due to a variety of factors; perfect combustion of fuel with minimum supply of air, minimum radiation losses, superheated steam, maximum heat in feed water, and minimum heat rejected in chimney gases.

Contributing Arts.

Before taking up the improvements in the use of steam for producing power, developments in the contributory arts should be given credit. For instance, prior to 1888 animal and vegetable oils were used entirely in lubrication. The theoretical advantages of high steam pressure and superheated steam were for a long time appreciated, but it was not until a lubricant was found that could withstand the high temperatures, that the use of superheated steam became feasible. The improvements in the fabrication of iron and steel, the development of the present day steel alloys, together with the application of heat treatment, have made possible the higher pressures, the lighter weights and the higher rotative and reciprocating velocities, all of which contribute to the economy of operation and reduction of fixed charges.

As already noted the steam pressures have increased from 70 lbs. per sq. in. to over 200 lbs. per sq. in. in some cases; and in steam motor cars and aeronautic motors, the pressures are as high as 500 lbs. per sq. in. gage.

In reciprocating engines the rotative speeds have been as high as 400 R. P. M. (revolutions per minute), and the piston speeds 950 feet per minute. In steam turbines the range in revolutions per minute extends from 185 R. P. M. in the turbines of a large ocean liner to 30,000 R. P. M. in the smallest size DeLaval, 3600 R. P. M. being a common rotative speed in medium size electric station practice.

One of the large Atlantic liners has four Parsons turbines developing 18,000 shaft horsepower each. In central station practice the largest reciprocating engine units installed have been 10,500 H. P., while the largest steam turbine units develop 50,000 H. P. at 1500 R. P. M.

Surviving Types.

Automatic cut-off engines of the Corliss type have been in use over 60 years, and are today, in many modified forms among the best examples of high efficiency stationary engines. Another type which has survived through an even longer period is the marine beam engine invented and designed, in 1844, by Robert L. Stevens and his nephew Francis B. Stevens. Some of the largest river boats are being driven, at the present time, by engines of this type with very slight modifications.

It is interesting to note that the first departure from the beam engine, in ferryboat service, was made by another nephew of Robert L. Stevens, the present Col. Edwin A. Stevens. What was a novelty in the ferryboat *Bergen* (1891) is common practice in ferry service today. This consists of using vertical compound marine engines driving two screws, one aft and the other forward, one pushing and the other pulling, by means of a shaft extending the full length of the hull.

In this country the engines most extensively used, especially in small sizes, have been simple plain slide valve non-condensing engines. These machines, even in normally good condition, are fearfully inefficient, averaging about 5.33 pounds of coal per hr. per D. H. P., or delivering but 3.3 per cent. of the energy in the fuel.

A number of engines designed for mill power plants have given economies equal to the Corliss. Of these the Putnam, a favorite mill engine throughout New England in the '70's and '80's, used governor controlled poppet valves. Engines of this class were more common in Europe than in this country, but the use of poppet valves has been revived here since the introduction of highly superheated steam. Another favorite class has been the automatic cut-off engine using gridiron valves. There have been a number of good examples, among them being the Brown, Green, Rollins, Slater and Wheelock engines.

High Speed, Reciprocating Engines.

The introduction of the high speed reciprocating engine dates from shortly after Mr. Edison's invention of the incandescent lamp and development of the direct-current generator in 1881. The isolated lighting plants, followed by small lighting and power plants, gave an impetus to shaft-governed automatic cut-off engines, allowing of higher rotative speeds than were attainable with drop cut-off mechanisms. Among these were: the Buckeye, the Porter-Allen, the Fitchburg, the Armington and Sims, the McIntosh and Seymour, the Ball, the Westinghouse, the Willans, and many others. These were built simple and compound and were operated either non-condensing or condensing. They varied in economy from 3.6 lbs. of coal per hr. per D. H. P. for simple non-condensing to 2.15 lbs. of coal per hr. per D. H. P. in compound condensing types.

Up to date the highest economy developed in reciprocating engines has been attained in the Stumpf (Straight) or Uniflow engine, obtaining a D. H. P. on 1.08 lbs. of coal per hr., this being in a 300 H. P. engine with an initial steam pressure of 130 lbs. per sq. in. absolute, and superheat of 261° F. This record has been equalled by performances of stationary triple-expansion

engines, using steam at 170 pounds per square inch absolute and 203° F. superheat. The highest of all steam engine efficiencies so far reached has been obtained by the Wolf tandem-compound *"locomobile"* which consists of an internally fired through-tube boiler, having the engine combined so that the cylinders are jacketed by the final pass of the hot gases flowing to the stack—in other words, the cylinder projects into the smoke box. The initial steam pressure is from 175 to 225 lbs. per sq. in. absolute, is superheated to 800—850° F. before entering the high pressure cylinder and again superheated to 450—500° F. before entering the low pressure cylinder. The feed water is heated in an economizer in the breaching. The coal consumption of 1 lb. per hr. per D. H. P. is common practice and 0.8 lb. per hr. per D. H. P. has been attained.

The Steam Turbine.

The reaction type of steam turbine, known under his name, was first introduced in England by the Hon. Charles A. Parsons in 1884, and was introduced in this country by the Westinghouse Company in 1895, but it was not until about 1900 that it met with general approval. The DeLaval impulse turbine was introduced in its present form in 1889. The compound velocity impulse turbine, known as the Curtis, was introduced in this country by Mr. Charles G. Curtis about 1896. Since their introduction there have been many modifications and combinations of these types, better fitting their application to various power developments. For central station work the steam turbine has replaced the reciprocating engine. In fact the turbine has the advantage in all electric generation, especially in the larger outputs. This is not, however, on account of better fuel economy, since for the same grades of machinery and equal ranges of temperature, pressure, etc., there has been found no appreciable difference in economy between the best turbines and the best reciprocating engines, other characteristics influencing the preference. The real reason for the replacement of the engine by the turbine has been the greater compactness of the latter, thus resulting in a smaller investment in real estate.

Boiler Efficiency.

There has been marked improvement in boiler efficiency since 1876. The combined efficiency of furnace and boiler, being the ratio of delivered energy in the steam to that available in the fuel, ranges in coal fired boilers from about 55 per cent. to 75 per cent. With liquid (oil) fuel and powdered coal, 80 per cent. is attainable. The most remarkable and promising development, the restriction being that the fuel must first be transformed into a gas, is the Bone system, of so-called "surface combustion." This consists in burning a perfect mixture of gas and air in boiler tubes filled with porous refractory material, the result being incandescent combination, with no radiation or excess air losses. An efficiency of 94 per cent. has been attained.

Engine and Boiler Efficiency.

The accompanying table presents comparative data of various engines and turbines, based on the latest and best authenticated performances available. In order to avoid confusion, a single basis of comparison has been selected, namely, delivered or brake horse power. The first column gives the steam economy in pounds per hr. per D. H. P.; the second column gives the economy in pounds of coal per hr. per D. H. P., the third the ratio of energy delivered to that supplied in steam, or the efficiency of the engine alone. The fourth gives the ratio of the delivered energy to that available in the fuel or the efficiency of engine and boiler combined. And the fifth and last column gives the ratio between the delivered energy compared with that of a perfect engine working on the Rankine cycle.

Type of Engine.	Steam per hr. per D.H.P. lbs.	Coal per hr. per D.H.P. lbs.	Ratio delivered energy to that in the steam—%.	Ratio delivered energy to that of the coal—%	Ratio delivered energy to that of a perfect engine—%
	I	II	III	IV	V
Simple throttling non-cond. engine....	48.0	5.33	4.25	3.30	39.2
Simple automatic shaft govrn.....	38.0	3.60	6.58	4.60	47.8
Simple Condensing Corliss	19.75	2.15	11.10	8.33	53.1
Comp. Cond. Automatic Shaft Gov.	19.75	2.15	11.80	8.90	55.6
Simple Condensing Poppet	15.50	1.72	13.12	9.80	47.6
Marine Triple	14.5	1.65	15.5	11.00	53.4
Marine Turbine	11.4	1.40	18.6	13.00	61.5
Land Turbine	10.6	1.30	20.0	14.0	66.2
Comp. Cond. Corliss...	10.05	1.11	20.2	15.0	72.2
Land Triple	10.08	1.12	19.8	14.6	65.5
Uniflow (Stumpf) Simple	9.0	1.08	22.1	16.8	73.1
Wolf Compd. Locomobile	8.9	1.00	22.4	17.5	74.1
Ljungström Turbine ..	8.0	0.91	24.4	18.3	74.7

Development of Electric Transmission

For the most economical generation of power it is necessary to employ large units conveniently located in regard to fuel and condensing water supply. The ultimate utilization of power, however, is usually in small amounts at many distant points. An essential element in the advance of steam engineering in the last forty years has therefore been the development of a highly efficient and adaptable system of power transmission—to wit, by *electricity*.

The early stations of Edison (1882) were primarily for electric lighting. Gradually electric motors were connected to the systems; and as their convenience became evident, their use grew until now-a-days the industrial application of electric power has become a broader field than that of lighting.

The Edison system employed direct current at the comparatively low voltage suitable for incandescent lamps, which limited the economical distance to which power could be transmitted to about one-half mile. The advent of the alternating-current system a few years later (1886) immediately extended the range of the electric station, for it permitted the transmission of power at much higher voltages with a stepping-down of voltage at the point of utilization by means of an *alternating-current transformer*. The importance of being thus able to change the voltage of a system by a stationary apparatus having high efficiency even in small sizes may be judged from the statement made a few years ago by Prof. Chas. F. Scott: "If we were to trace the electric development of the past twenty-five years, we should find the transformer as the simple factor which has determined the whole course of that development."

The early alternating-current plants were single-phase and no type of motor was then available for operation from them. The announcement of the Tesla induction motor in 1888, operated by polyphase alternating current was followed by the gradual change to polyphase systems; until at the present time practically all electric power is generated and transmitted as high-voltage polyphase alternating-current power. In cases where direct current is particularly adapted, it is readily converted from alternating current by means of rotary converters, thus entailing no limitation on alternating-current generation and transmission.

Flexibility and Convenience of Electric Transmission.

Subsequent advances in electrical engineering were largely concerned with such improvements in the design of transformers, transmission lines, protective devices, etc., as to permit successive rises in the operating voltage; for the distance to which power can economically be transmitted increases directly with the voltage. The original Edison voltage of about 100 volts was later doubled by the use of the three-wire system. The alternating-current system multiplied this immediately by five or ten. In 1891 a transmission voltage of 10,000 volts was achieved. Now several systems are operating at over 100,000 volts. While the early systems were confined to a single city or part of a city, we now have single transmission networks extending over many states and electric power being transmitted in block for hundred of miles. Engineers are looking forward to a universal distribution network covering the entire country, power being supplied to the system at various suitable points, such as the mouths of coal mines and natural hydroelectric sites, and power being withdrawn for utilization at points best suited for the industries, for railways and for electric lighting. Such a universal system would be analogous to the system of interconnected railways, employing a standard gage track and interchangeable rolling-stock, which we now take as a matter of course.

In recent years, the rapid growth of electric power systems has been largely due to the replacement of inefficient and inconvenient prime movers combined with mechanical transmission, by electric motors supplied from large generating plants. The U. S. Census reports show that the total horsepower of electric motors used in manufacturing increased nearly *ten times* in the decade 1899-1909. An important feature of electric drive, not measurable in terms of saving of fuel, has been its greater flexibility, leading to increased production and consequent reduction of overhead charges.

Source and Distribution of Power.

The following power statistics based on the Thirteenth U. S. Census report will be of interest. The power used in transportation is not included:

Year	Total Horsepower per each 1,000,000 of Population	Percentage of Distribution of the Total Power			
		Steam	Water	Internal Combustion	Through Electric Motors
1915	482,392	61.2	24.4	14.3	51.0
1909	203,163	76.0	9.8	4.0	25.8
1904	160,760	80.3	12.2	2.1	11.8
1899	132,875	80.6	14.4	1.3	4.9
1889	94,832	77.1	21.1	0.15	0.26
1879	68,182	64.1	35.9	....	....
1869	60,846	51.8	48.2	....	....

The following table giving the percentage of increase of the various prime movers and electric motors during ten year periods is taken directly from the Thirteenth U. S. Census Report:

Period	Total Horsepower	Steam	Water	Gas	Electric Motors
*1915—1909	162.3	111.2	557.7	831.9	5032.0
1909—1899	84.9	74.4	25.4	181.1	877.2
1899—1889	70.0	77.7	15.9	214.5	3066.1
1889—1879	74.1	109.6	2.4	....	.....
1879—1869	45.4	79.8	8.4	....	.....

* Six years—(Rushmore).

Below is an estimate of the distribution of power in 1915, as made by Mr. D. B. Rushmore:

	Horsepower	
Horses and mules	25,000,000	
Automobiles	25,000,000	
Steam and naval vessels	5,000,000	
Steam railways	50,000,000	
		105,000,000
Irrigation	500,000	
Mines and quarries	6,000,000	
Flour, grist and saw mills	1,250,000	
Manufacturies	25,000,000	
Central stations	8,000,000	
Isolated plants	4,250,000	
Electric railways	4,000,000	
		49,000,000
		154,000,000

The figures 482,392 total horsepower per one million of population in 1915, given in the first table of power statistics, is the sum of the last seven items of the above list divided by 101,577 million, the total continental population in 1915. All other items in the two tables are taken directly from the Census Report.

The Service of Capital.

The development of the steam engine illustrates very clearly the part which capital plays in community progress. A steam engine is the servant of the community, no matter who owns it, and the improvements upon the engine, the changing over of power plants to bring them up to date, and the construction of new power plants, constantly absorb an enormous amount of new capital. Into such enterprises the profits of business largely go, while the resulting benefits go to the entire community. The man without property, who spends every dollar of his income the same week he receives it, is able to buy more with his wages because steam engine efficiency has been doubled in the last forty years.

When this employment of wealth is understood it will be seen that there is a very general misapprehension in society about its real distribution. The entire community is the ultimate beneficiary of all wealth invested productively, just as the public is the ultimate beneficiary of all the earnings of the Federal reserve banks above the six per cent. which they are allowed to pay out in dividends. There are no restrictions upon the earnings of these banks, or the charges they shall make, but after they have paid six per cent. in dividends and accumulated certain reserves, all the earnings must go into the public treasury. This is done by statute law, but natural law disposes of a rich man's earnings in practically the same way. He may draw out what he likes for his living expenses, but all that he puts back into industry is devoted to the public. This is an inevitable distribution, fixed in the constitution of things, and progress would be much more rapid if this natural law was recognized.

Making Good War Losses.

The world is suffering frightful losses through the war, and people are wondering what the effects of these gigantic debts will be

upon the earnings of industry and the welfare of the peoples. We may learn something about this from the experience of the past. "It is our improved steam engine," wrote Francis Jeffrey in the *Edinburgh Review* in 1819, "that has fought the battles of Europe, and exalted and sustained, through the late tremendous contest, the political greatness of our land. It is the same great power which enables us now to pay the interest on our debt, and to maintain the arduous struggle in which we are still engaged with the skill and enterprise of other countries less oppressed with taxation."*

The steam engine which helped England bear the burdens of the wars with Napoleon was a poor affair compared with the engine of to-day, but even the latter, as Mr. Manning and Professor Anderson have indicated, may have its average efficiency in practice greatly increased. Beyond these prospective gains are those which lie in other sources of power, and in all the improvements in industrial equipment which are only partially introduced, or as yet only forming in the minds of inventors. And more important than all these are the possibilities which lie in more thoroughly organized and harmonious industry, the development of intelligence and efficiency among the people, and the spread of a better understanding of common interests. We must look to these changes for gains in production which will enable society to overcome the losses of the war, and repeat the progress accomplished by the original application of the steam engine to industry.

* Quoted by Professor Charles Downer Hazen, in "Europe since 1815," p. 408.

STATEMENT OF RESOURCES AND LIABILITIES OF EACH OF THE TWELVE FEDERAL RESERVE BANKS AT THE CLOSE OF BUSINESS AUGUST 24, 1917.

(In Thousands of Dollars)

RESOURCES	Boston	N. Y.	Phila.	Clev'd	Rich'd	Atlanta	Chicago	St. Louis	M'npl's	Kas.City	Dallas	S.Fr'sco	Total
Gold coin and certificates in vault	26,544	229,517	28,739	29,869	6,228	7,007	40,115	4,337	17,092	8,469	13,681	15,153	426,751
Gold Settlement Fund	17,553	117,279	26,867	54,347	30,798	5,684	46,481	25,678	7,871	38,263	6,025	20,221	397,067
Gold with foreign agencies	3,675	18,112	3,675	4,725	1,837	1,575	7,350	2,100	2,100	2,625	1,838	2,888	52,500
Total gold held by banks	47,772	364,908	59,281	88,941	38,863	14,266	93,946	32,115	27,063	49,357	21,544	38,262	876,318
Gold with Federal Reserve Agents	25,822	206,898	32,161	32,121	8,781	18,902	70,007	15,953	19,292	14,476	15,636	28,487	488,536
Gold Redemption Fund	500	2,500	700	44	850	602	244	382	589	522	427	15	7,375
Total gold reserves	74,094	574,306	92,142	121,106	48,494	33,770	164,197	48,450	46,944	64,355	37,607	66,764	1,372,229
Legal tender notes, Silver, etc	3,724	39,406	1,204	491	131	653	3,413	1,593	347	334	1,153	91	52,540
Total Reserves	77,818	613,712	93,346	121,597	48,625	34,423	167,610	50,043	47,291	64,689	38,760	66,855	1,424,769
Bills discounted, Members	16,959	15,327	9,762	5,950	13,691	5,690	12,757	8,657	12,727	12,206	6,942	7,739	128,407
Bills bought in open mark't	17,544	49,898	18,608	20,026	2,384	1,608	19,601	5,461	2,281	11,504	1,985	8,657	159,557
Total bills on hand	34,503	65,225	28,370	25,976	16,075	7,298	32,358	14,118	15,008	23,710	8,927	16,396	(c)287,964
U. S. Governm't long-term securities	610	2,805	549	7,918	1,192	704	12,062	2,255	1,859	8,849	3,970	2,453	45,226
U. S. Governm't short-term securities	2,194	3,538	2,548	2,918	1,969	3,522	3,360	1,465	1,554	1,784	1,868	3,760	30,480
Municipal Warrants			131	1,055							46		1,232
Total Earning Assets	37,307	71,568	31,598	37,867	19,236	11,524	47,780	17,838	18,421	34,343	14,811	22,609	364,902
Due fr. other F. R. Bks. net	639					1,416	22.253	586		458		3,033	(b) 243
Uncollected Items	14,441	58,652	28,539	16,714	12,417	9,421	27.354	10,011	5,076	10,739	8,905	8,118	210,387
Total deduction from gross deposits	15,080	58,652	28,539	16,714	12,417	10,837	49,607	10,597	5,076	11,197	8,905	11,151	210,630
5% redemption fund against F. R. bank notes										400	100		500
All other resources						66		10			179	84	339
TOTAL RESOURCES	130,205	743,932	153,483	176,178	80.278	56,850	264,997	78,488	70,788	110,629	62,755	100,699	2,001,140
LIABILITIES													
Capital Paid in	5,373	12,123	5,277	6,365	3,470	2,507	7,651	3,260	2,524	3,203	2,757	3,974	58,484
Government Deposits	9,112	4,126	1,809	6,287	5,578	1,021	11,245	3,071	5,535	3,446	3,042	5,700	59,972
Due to members—reserve account	72,319	420,957	70,694	104,649	37,275	26,740	150,525	43,762	35,800	66,858	29,980	61,570	1,121,129
Due to nonmember banks clearing acc't		30,924					1,746					263	32,933
Collection Items	13,745	24,841	26,250	13,729	10,671	4,794	18,226	7,442	2,517	7,283	3,659	4,798	137,955
Due to other F. R. Bk's net		15,425	6,488	2,788	2,713				139		589		
Total Gross Deposits	95,176	496,273	105,241	127,453	56,237	32,555	181,742	54,275	43,991	77,587	37,270	72,331	1,351,989
F. R. Notes in actual circulation	29,323	224,151	42,728	42,358	20,518	21,788	75,537	20,953	24,227	24,344	22,728	24,394	(a)573,049
F. R. Bank Notes in circulation, net liability										5,473			5,473
All other Liabilities incl. Foreign Govern't credits	333	11,385	237	2	53		67		46	22			12,145
TOTAL LIABILITIES	130,205	743,932	153,483	176,178	80,278	56,850	264,997	78,488	70,788	110,629	62,755	100,699	2,001,140

(a) Total Reserve notes in circulation, 573,049.

(b) Difference between net amounts due from and net amounts due to other Federal Reserve Banks, 243: The Gold Reserve against net deposit Liabilities is 76.0%; Gold and lawful money reserve against net deposit liabilities 80.6%. Gold Reserve against Federal Reserve Notes in actual circulation, 86.5%.

(c) Bills discounted and bought; municipal warrants: 1—15 days 89,809; 16—30 days 55,667; 31—60 days 96,827; 61—90 days 43,718; over 90 days 3,175. Total 289,196.